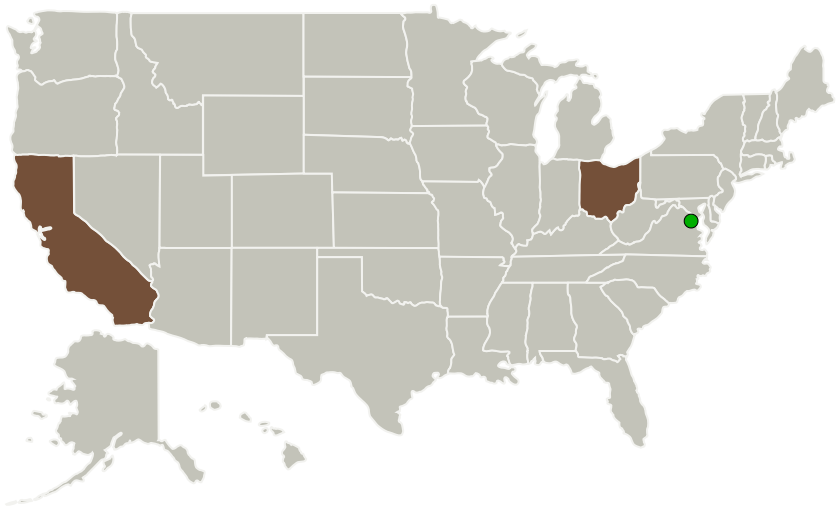
Multi-channel Combining for for airborne flight research using Standard Protocols

Completed Technology Project (2015 - 2017)

Project Introduction

Glenn Research Center (GRC) proposes a 2-year effort for the Core Topic Area: Operations Technologies. The technology specifically supports NASA's Earth Science airborne systems including Uninhabited Aerial Vehicles (UAVs) including autonomous operations and improvements in efficient operations of real-time communications for airborne science research. The airborne science research aircraft such as the Global Hawk, DC-8 and P-3 use custom channel combining of Iridium satellite phones to continuously monitor science payload and housekeeping data as well as science payload power control and reporting. This technology is also used for aircraft control. The current systems have known problems, which results in inefficient data delivery and poor reliability ' particularly when attempting to use standard Internet protocols to login and control. The Internet community recently announced an experimental protocol, multipath-TCP. We propose to characterize the current Iridium modems and model those channels. We will then evaluate multipath-TCP as a generic solution to the channel-combining problem when using TCP and to utilize those techniques inherent in multipath-TCP to develop standardized multipath-UDP. Multipath-UDP would provide a standardized channel-combining technique when using applications that have UDP-based datagram delivery. The Technology Readiness Level is currently 2 for all multipath-TCP using noisy and unreliable links. The system will initially be tested in a laboratory environment but will quickly move to real modems and hardware to obtain a TRL of 6 (System/subsystem model or prototype demonstration in a relevant environment.) If we can develop a software only solution that will work with existing hardware we could obtain a TRL of 8 (flight qualified through test and demonstration) by the end of the project.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Science Mission Directorate (SMD)

Responsible Program:

Advanced Information Systems Technology

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Organizations Performing Work	Role	Type	Location
NASA Headquarters(HQ)	Supporting Organization	NASA Center	Washington, District of Columbia

Primary U.S. Work Locations	
California	Ohio

Project Management

Program Director:

Pamela S Millar

Program Manager:

Jacqueline J Le Moigne

Principal Investigator:

William D Ivancic

Co-Investigators:

Don Sullivan
Ann P Over

Technology Areas

Primary:

- TX11 Software, Modeling, Simulation, and Information Processing
  - TX11.4 Information Processing
    - TX11.4.2 Intelligent Data Understanding

Target Destination

Earth